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23 February 1977

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TRANSLATIONS ON EASTERN EUROPE

SCIENTIFIC AFFAIRS

No. 536

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CONTENTS PAGE

BULGARIA

LUBRICANTS OF THE FUTURE DISCUSSED

Sofia VOENNA TEKHNIKA in Bulgarian No 10, 1976 pp 4-5

[Article by Engineer Colonel Ivan Iliev, candidate of technical sciences, and Engineer Lieutenant-Colonel Ivan Tanchev, candidate of technical sciences: "Antifriction Self-Lubricating Plastics (ASP) -- the Lubricants of the Future"]

[Text] The lubricants used at critical junctions of machines may in certain instances be regarded as a kind of construction material affecting the efficiency of the rubbing surfaces as much as the materials from which the parts are made. The specifications set for them have constantly grown with the development of science and technology.

The need for lubricants to assure normal lubrication of rubbing surfaces under varying temperature conditions that will not change the chemical composition of their structure under irradiation, as well as certain other requirements have made it imperative to seek new lubricants.

Soviet scientists, as a result of thorough investigations, have succeeded in creating antifriction self-lubricating plastics (ASPs) for joints operating under dry friction, which combine the properties of solid lubricants and construction materials. They represent multicomponent systems possessing a complex of valuable properties, ranking first among which are thermal, chemical and radiation resistance, technological properties during manufacturing, long shelf life etc.

In confirmation of the fact that they are highly thermostable, we can cite the fact that whereas liquid lubricants can operate normally in a temperature range from 213 to 423° K (from -60 to -150° C), ASPs are able to assure the normal operation of rubbing surfaces in a temperature range from 73 to 573° K (from -200 to -300° C).

An especially valuable property of ASPs is their low friction coefficient value and its stability despite temperature variation. In this regard, they are appreciably superior to plastics with fillers such as molybdenum

disulfide, graphite etc., used as solid lubricants. In this regard, the curves (Figure 1) showing the variation of friction coefficient as a function of temperature for various materials are significant.

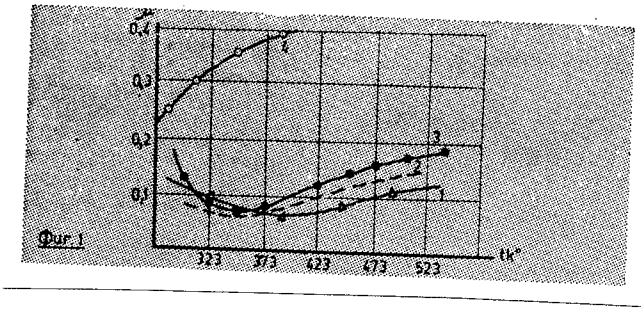

Figure 1. Variation of friction coefficient as a function of temperature:

1) TESAN; 2) ESTERAN; 3) AMAN; 4) textolite with antifriction fillers

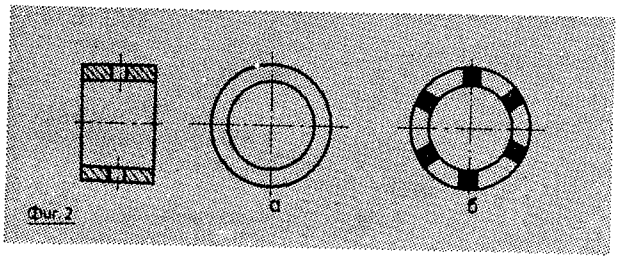

Figure 2. Bushing test specimens: a) of steel (bronze) without ASP; b) of steel (bronze) with grooves and pressed-on ASP (black fields)

From the curves that are shown it is not difficult to establish that for textolite with fillers (Curve 4) the friction coefficient grows sharply with a rise of temperature and at a temperature of 374-393° K (100-120° C) the friction coefficient goes as high as 0.4, whereas for ASPs (curves 1, 2, 3) a rise of temperature has a negligible effect on the magnitude of the friction coefficient and at a temperature of 523° K (250° C) it does not exceed 0.2.

We conducted friction tests with steel-and-bronze specimens in the absence of ASPs and with esteran-41 and AMAN-2 pressed on to them, as shown in Figure 2.

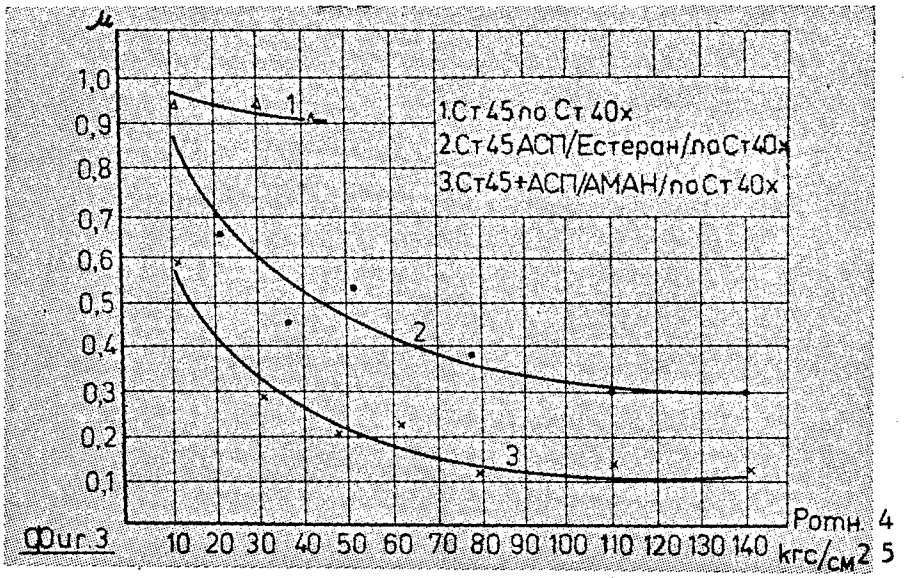

Figure 3. Variation of friction coefficient as a function of loading for steel-on-steel friction without lubricant

Key:

1. Steel 45 on steel 40 kh
2. Steel 45 plus ASP (Esteran) on steel 40 kh
3. Steel 45 plus ASP (AMAN) on steel 40 kh
4. Relative pressure
5. kgf/sq cm

All experiments were conducted on a frontal friction testing machine. The machine made it possible to vary the load and determine the friction coefficient. All experiments were conducted at a constant rate of friction (23 cm/sec). As the experiments showed, the presence of ASPs in the friction zone has an exceptionally favorable effect on rubbing surfaces even in the absence of any other lubricant. In the case of steel-on-steel friction without a lubricant, absence of the seizure of rubbing surfaces was observed up to a relative pressure of 4.7 MN/sq m (47 kg/cu m).

The character of the variation of the friction coefficient and the determined magnitudes (0.90-0.96) are not at variance with the data in the literature. Further increase of pressure became impossible due to the onset of seizure and sticking of the rubbing surfaces.

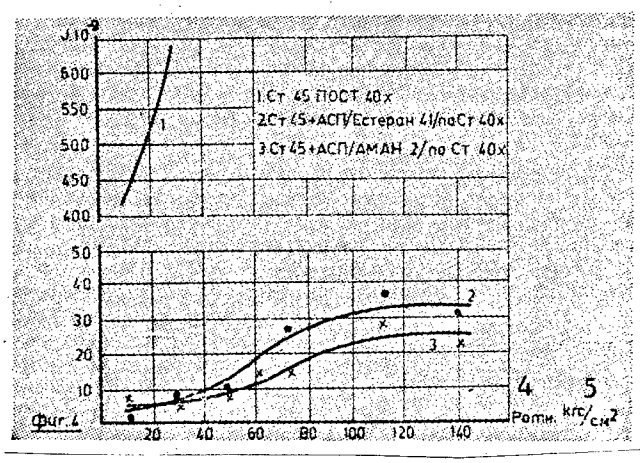

Figure 4. Effect of loading on rate of wear for steel-on-steel friction without lubricant

Key:

1. Steel 45 on steel 40 kh
2. Steel 45 plus ASP (Esteran-41) on steel 40 kh
3. Steel 45 plus ASP (AMAN-2) on steel 40 kh
4. Relative pressure
5. kgf/sq cm

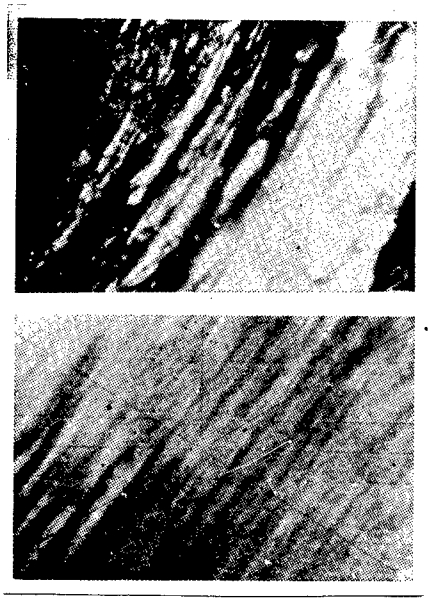

Figure 5a (top); Figure 5b (bottom)

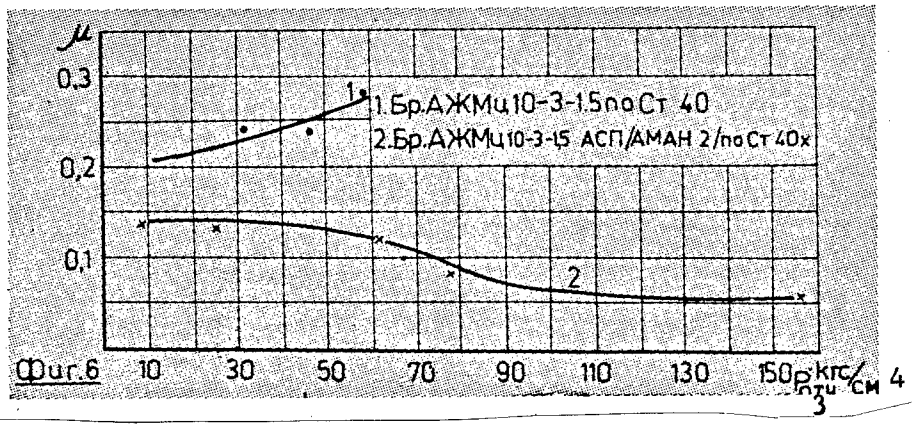

Figure 6. Variation of friction coefficient as a function of loading for bronze-on-steel friction without lubricant

Key:

1. Bronze AZhMts 10-3-1.5 on steel 40
2. Bronze AZhMts 10-3.1.5 plus ASP (AMAN-2) on steel 40 kh
3. Relative pressure
4. kgf/sq cm

The specimens of materials with no ASP pressed on, used in analogous conditions, made possible a reduction of the friction coefficient and an increase of relative pressure to 18 MN/sq m (180 kg/sq cm), determined not by seizure and sticking of the rubbing surfaces, but by breaking off of the ASPs. Moreover, an increase of loading resulted in a decrease in the magnitude of the friction coefficient (Figure 3). The magnitude of the latter depended both on the make of ASP and on the quantitative ratio between steel surface and ASP surface.

A decrease in the friction coefficient was accompanied by a significant decrease in the rate of wear (Figure 4). Whereas with an increase of loading from 1.1-4.7 MN/sq m (11-47 kg/sq cm) the rate of wear for steel-45-on steel-40 kh friction without a lubricant ranged from $410 \cdot 10^{-9}$ to $645 \cdot 10^{-9}$, with an ASP present in the friction zone it declined 45-60 times under the same load.

The external appearance of rubbing surfaces, magnified 50 times, is shown in the photographs (Figure 5a without ASP and 5b with ASP). Clearly visible in the photographs is the decrease in the extent of erosion of the rubbing surfaces with ASP present in the friction zone. In the case of

the joint action of bronze on steel, the presence of an ASP likewise had the favorable effect of lowering the friction coefficient (Figure 6). The results shown were obtained only with the ASP AMAN-2.

In the course of the tests intense chipping was observed, due most likely to defects when it was pressed on to the bronze bushings. The rate of wear was appreciably less here than that for steel-on-steel friction, but increased sharply also with an increase in loading, whereas with an ASP present, almost total absence of any effect of loading on the rate of wear was observable.

Tests according to the methodology here set forth were conducted with various kinds of lubricant present, as well as with an abrasive present in the friction zone. The essential conclusion from analysis of the conducted tests is that the presence of ASPs can lower abrasive wear by 10-12 percent.

The ASPs themselves are in a powdered state and can assume any form we desire by pressing at the specified temperature and pressure. The use of multi-impression molds for the purpose accelerates the technological production process and lowers the production cost of output. They can be pressed onto metal surfaces and then machined to requisite dimensions. They can also be glued to metal or plastic surfaces with various kinds of adhesives.

When an ASP is working together with steel or other metal, accidental failure of the surfaces working together is impossible since the rubbing parts represent a monolithic self-lubricating mass.

ASPs are used most often to make the cages in rolling-contact bearings, as well as for bushings for slide-bearings where high speeds of rotation (up to 16,000 rpm) are required, or for comparatively low speeds with a high relative pressure of 15-20 MN/sq m (150-200 kg/sq cm).

The use of ASPs is especially efficient at high temperatures. Thus, for example, at a temperature of 523° K (250° C) rolling-contact bearings with ASP cages are in good condition after 1000 hours of operation, whereas bearings of the same type with textolite cages fail in a few hours of operation.

Although the production of ASPs and parts made thereof has still not assumed mass character, bearing cages made out of them are cheaper than the textolite cages now used.

This far-from-complete characterization of ASPs and their adduced advantages, as well as the favorable estimate of the operation of parts made therefrom, delineate the brilliant prospects of ASPs as the lubricant of the future. There is no doubt that they will, on an increasingly wider scale, become part of the technical products, military materiel and everyday life of the people.

6474
CSO: 2202

NEW COMPUTER COMPLETED

Sofia RABOTNICHESKO DELO in Bulgarian 25 Nov 76 p 4

[BTA news item]

[Text] The staff of young engineers of the Capital Central Institute of Computer Technology has completed the assembly of the operator's panel of the new YeS-1035 digital electronic computer. The machine is part of the unified system of electronic computer equipment which is being developed in CEMA-member countries. The new machine, which is being developed jointly with the Scientific Research Institute for Electronic Computers in Minsk, is a representative of the so-called "third and a half" generation of computers.

The operator's panel is made according to technical instructions compiled by Bulgarian and Soviet specialists. It is equipped with a Bulgarian IZOT-132-D typewriter and an electronic chain printer. The print-out rate is three times that of the YeS-1020.

6474
CSO: 2202

NEW MEMORY DISCS AND TAPES FOR MINICOMPUTERS

Sofia RABOTNICHESKO DELO in Bulgarian 17 Nov 76 p 3

[Article by Zhelez Subotinov: "Storage Units for Minicomputers"]

[Text] Minicomputers are finding ever wider application in the gathering, processing and accurate utilization of information. Their low price, reliability and operating advantages are opening doors for them into factory workshops, agrarian industrial complexes and transport enterprises.

Our country enjoys great prestige as a producer of peripheral equipment intended for the storage of necessary information in small electronic computers. A number of computers in many countries throughout the world are already equipped with YeS-5069-01 and IZOT-5003 minidisc and minitape storage systems. Industry is now familiarizing itself with the new, more modern developments of scientific workers, engineers and technicians of the Institute of Computer Technology in Sofia.

The Storage-Unit Plant in Stara Zagora is introducing the YeS-5074 minidisc memory with flexible magnetic disc developed by the team headed by Chief Designer Engineer Luka Yordanov. It will be used to accumulate data in minicomputers and in input units of computer terminal packages. By combining the advantages of the disc system with contact recording on one working surface, up to 3.2 million characters can be recorded on a thin plate.

Under the direction of Engineer Petur Zhelezarov, specialists have also designed another kind of storage unit -- one with a magnetic cassette. It will be installed on commercial electronic cash registers and can record, by quantity and value, the various goods that are sold. This will significantly facilitate accounting and financial operations in stores, and a conclusion regarding warehouse inventories will be readily drawn.

In their specifications the new IZOT-5005 and IZOT-5006 minitape units come closer to large magnetic-tape information-storage systems. With

them, designers have succeeded in achieving maximum standardization of electronic equipment and mechanical assemblies. Their technology is adapted not only to the capabilities of the Storage-Unit Plant in Plovdiv which will produce them, but also to the electronic parts produced by the socialist countries.

6474
CSO: 2202

NEW SCIENTIFIC INSTRUMENTS DESCRIBED

Sofia TEKHNICHESKO DELO in Bulgarian 13 Nov 76 p 2

[Article by Zdravko Marinov: "In the Institutes of the Bulgarian Academy of Sciences"]

[Text] Low-Background Apparatus

The Solid-State Physics Institute of the Bulgarian Academy of Sciences has developed a low-background apparatus. It is intended to make precise measurement of low beta-activity. Owing to its high sensitivity the apparatus can precisely determine the beta-radioactive isotope pollution rate of various food products, feeds, soils etc.

The apparatus has high specifications. Significant economic effect is expected in addition to its great effect on health.

TM-2 Tesla Meter

The Electronics Institute of the Bulgarian Academy of Sciences has created an instrument, the TM-2 Tesla Meter, intended to measure the polarity and magnitude of induction of constant magnetic fields in electromagnets, relays, magnetic systems, radar instruments, and in a number of electric and electronic devices. It has been recognized as an invention.

The instrument is very sensitive, precise and quickly adjustable, and reads results directly. In addition to the scientific effect from the practical application of the instrument, an economic effect in the national economy is expected.

Disintegrator-72

The Central Instrument-Manufacturing Base of the Bulgarian Academy of Sciences has created a unique scientific apparatus that is used to destroy the cellular membranes of various species of microscopic algae,

yeasts and microorganisms without disturbing the biological activity of the proteins, enzymes and other useful constituents that they contain.

Methods hitherto known for doing such a job are quite slow and tedious and require more attendants. With them, the efficiency that is achieved is of the order of 72 percent and the activity of the cellular constituents is very low or may not be determinable at all by electrophotometric analysis.

The advantages of the new apparatus are that it increases efficiency by 99 percent and simultaneously preserves the high biological activity of proteins and enzymes. It accelerates the working process, which is an important condition for obtaining more reliable results.

The economic effect from adoption of the apparatus manifests itself in the saving of manpower. The apparatus can be made in various sizes depending on process-tracking needs and the amount of work.

6474
CSO: 2202

COMPUTERIZED PATENT INFORMATION SYSTEM ESTABLISHED

Budapest SZAMITASTECHNIKA in Hungarian No 12, 1976 p 7

[Text] The fifth section of the Comprehensive Program approved at the 25th session of the CEMA (cooperation in the fields of science and technology) devoted a special paragraph to matters of scientific and technical information. According to the provisions of this paragraph, the CEMA member countries are to intensify the cooperation among the national scientific and technical information systems, and will undertake measures toward establishing an international scientific and technical information system (NTMIR). The international system will be based on the cooperation among the national systems, the creation of international information subsystems according to disciplines and information types, and the activities of the international information center (NTMIK) set up by the CEMA member countries. Dr Pal Gagyor, member of the Scientific Council of the NTMIK and director of the Scientific and Technical Information Institute for Metallurgy and Machine Industry (KGTMTI) informs our readers about the status of one of the special branches of NTMIR, namely the patent information system.

One of the important methods for ensuring economic growth and for reaching the technical level of developed industrial countries in a gradual manner is the learning about and exchange of patents, licenses, and the technical documentation of these, meaning close cooperation in matters related to inventions, patents, and so forth. In Hungary, the importance of patents increases all the time in our economic and industrial policies. Only those products which are manufactured by means of modern methods and which meet modern technical standards can be sold profitably on domestic and export markets. Thus, technical development cannot be carried out without knowledge about patents embodying the latest technical advances. Since our

productivity must increase as a result of the labor situation, we are particularly compelled to carry out intensive development, reduce the manufacturing costs, and utilize the latest technical solutions and methods. In order to accomplish these goals, we must know and use the patent specifications. Proper decisions in the designation of research goals and development plans can be rendered only if the leaders can review the latest and most modern technical achievements on the basis of a study of the patents. Whether the perusal of the patents should result in development projects or procurement of licenses is still an open question.

First, the KGTMTI processes the latest patent data from the United States, the German Federal Republic, France, Great Britain, and Japan, based on NSZO [patent classification]. This operation alone represented approximately 300,000 subjects per year. At the request of enterprises, we provide the bibliographic data of the patents, their annotations, and in most instances also sketches. The up-to-date recording and processing of the patent information today requires international cooperation. The KGTMTI is engaged in the establishment of patent data subsystems dealing with metallurgy and machine manufacture. According to the plans, the subsystems will permit studies from the points of view of patent holder, country, and priority (in subject categories). The data will be used to issue rapid patent information bulletins. Subject studies may be carried out according to international subject classification (NSZO), section, class, subclass, group, and subgroup. Subject studies based on patent owner permits us to follow the industrial and trade policies of competing enterprises, as well as the developments in a given area of technology.

Once we have patent information about computer technology, the user of the information system will be able to follow worldwide technical trends and can carry out retrospective searches. He can find out whether a given technical solution is under patent protection in Hungary, what inventions a given foreign enterprise has patented in Hungary or elsewhere, and where there is expired patent situation, meaning usable information. He can establish whether infringement of a patent can be avoided by circumvention. He may appeal against a patent which infringes on prior rights, so as to protect his situation, and if a patent already damages his rightful interests, he may petition for nullification or license fees.He may explore the potentials of license procurement or sale. He may obtain information about the patent policies of domestic and foreign enterprises, and about their trade intentions. For the purpose of export market study, he may evaluate the industrial structure of a given country.

The International Patent Bibliography and Processing System (ASZBA) of the socialist countries covered ten bibliographic data of the patents during the first stage of its development: the publishing country, the type of

document, the application number, the application date, the international classification, the country of priority, the number and date of the priority application. In the second stage, this approach will include the name of the patent holder and inventor, and the subject matter of the patent. Hungary started the transfer of this into the international system in May 1976. The transfer is carried out through the State Committee of Inventions and Patents of the Council of Ministers of the Soviet Union, one of the leading organs of the NTMIR.The third stage, covering the period from 1968 retroactively, will record the data on magnetic tape. Short summaries and full patent specifications will be issued from the data on the magnetic tape.

So far, the ASZBA program contains data of about one million patents from 41 countries; in 10-20 years this will expand to at least 10-20 million since the number of member countries increases at a gradual rate. The protection period of the patents varies from one country to another; in general, a patent is in force for 15-20 years. This provides a special feature for patent information: it does not become obsolete.

It can be seen from the foregoing that the patent information service can be handled only by computerization in view of the large number of participating countries and the almost explosive growth of patent information. It is characteristic of the wide manufacturing profile of the Hungarian metallurgical and machine-manufacturing industry that approximately 60-70 percent of this huge amount of information is needed for enterprises and cooperatives operating under the jurisdiction of the KGM [Ministry of Metallurgy and Machine Industry].

In Hungary, preparation, implementation, and use as part of technical development of computerized patent information is carried out by the National Inventions Bureau (OTH) and our institute. The continuous assistance of the OTH and its participation in international projects ensures joint, well coordinated operations.

The most difficult phase of computerized patent information is the start of this complex operation; it must be an integral part of technical development, so as to promote and increase our development of competitive and exportable goods of the international quality level.

Soon we will issue a metallurgical and machine-manufacturing standard for product and technique studies. Computerized patent information will provide valuable help here also.

2542
CSO: 2502

NEW, HIGH-POWER TRANSMITTER FOR KOSSUTH STATION AT SOLT UNDERGOES TESTS

Budapest NEPSZABADSAG in Hungarian 18 Jan 77 p 10

[Article by Gabor Pal Peto: "The Testing of the Radio Station in Solt, of 2000 kW Power Has Started. The New Kossuth Transmitter"]

[Text] The 2000 kilowatt transmitter located near Solt started trial transmissions two weeks ago. It transmits the program of the Kossuth station in the medium wave range. Like any other complex technical system, the transmitter also requires a "trial run" for some time; during this period, any small or major defects become evident and can be rectified. There are defects which manifest themselves only when the system is operated continuously over a period of time. During the trial period, the transmitter in Lakihegy stands ready to take over the transmissions within a few seconds' notice.

Even 300 Kilowatts is Now Not Enough

The primary program of Hungarian radio, the program of the Kossuth Radio, was first transmitted at power of 2 kW by the Lakihegy transmitter, which was built in 1925. Since 1968, the power of this transmitter has been 300 kW. It has been felt for some time that even this power is inadequate. Ever since the frequencies were allocated among the European radio transmitters by the Copenhagen agreement (which was signed in 1948) — frequency is just another term for the wavelength — major changes have taken place: many new transmitters were built and some existing transmitters have increased their power.

For all practical purposes, this meant that the provisions of the agreement have fallen by the wayside, and many stations have started broadcasting in Europe, Africa, and the Middle East which had the same frequency as the Kossuth Radio, or a frequency so close to that of the Kossuth Radio that

the reception of the Kossuth Radio's program was interfered with (this was due to the so-called side channel effect). In order to overcome the interfering effect of a transmitter broadcasting at the same wavelength, the field strength of Kossuth Radio had to have a power of at least 26 dB (decibel) higher than the other station at the same location; an advantage of 9 dB would be required to overcome the interference of a transmitter broadcasting at the side channel. Let us remember, however, that the dB is a logarithmic rather than a linear scale, meaning that an advantage of 26 dB means a field strength more than 20 times as high.

Giant Tower

The interference became so pronounced in recent times that a decision was reached in 1972 to construct a new medium-wave transmitter with a power of 2000 kW. Lakihegy was judged unsuitable for this purpose, first of all because it would have been necessary to reconstruct the transmitter entirely, and second, since the proximity of the capital city would have created interferences as a result of electronic communications and other factors. After a thorough study, the area around the municipality of Solt was chosen; this area is about centrally located in the country (although this was not a decisive factor in the selection). At the new international frequency-allocation conference, signed in Geneva in 1975, the Solt transmitter was approved and its allocation is in effect from November 1978 onward.

Why do we need a medium-wave transmitter of such a power today, when the UHF transmitters are becoming more developed? There are two reasons for this. One reason is that the entire area of Hungary, or most of it, can be covered by a single medium-wave transmitter, whereas ten UHF transmitters would be required as the alternative (even though each of these would be lower-powered). The second reason is that less than 22 percent of all radio receivers operating in the country presently are capable of receiving UHF broadcasts (only a handful of the portable or pocket radios). Of course, nobody can be excluded from the coverage of the main national radio program; indeed, the goal is to make sure that satisfactory reception is available practically everywhere.

Decision on the new transmitter was made on the basis of these considerations. We have purchased the radio-engineering facilities and the almost 300 m tall antenna tower for the Solt station from the Soviet Union. The transmitter is a most modern facility; it was specifically developed for this station and it was tried in a fully assembled form right at location for the first time (this would not have been feasible at the manufacturing location). There is only a single transmitter of such power in Central and

Eastern Europe; it is located in Belgrade.

The new Kossuth station is located near Solt, five kilometers from the municipality limit; it occupies 81 hectares. The lot of 900 by 900 meters accommodates a three-part building. One houses the transmitter itself, the second houses the service facilities, and the third houses the power supply units.

At a distance of 435 meters from the station is the uniform cross-section antenna tower. It has a triangular cross section, with an edge length of 2.5 meters. It is constructed from six-meter sections, and weighs 185 tons. It is made from welded tube. It is secured with guy cables with insulator inserts, radiating in 120-degree directions. The tower stands on a single base insulator — designed for a voltage of 200,000 volts — and it was designed in such a manner that the broadcast properties are best if it broadcasts the carrier frequency of the Kossuth station.

The power for the Solt station is obtained from Dunaujvaros; the power comes over a 14 kilometer, dual-system 120 kV transmission line to a receiving station two kilometers from the transmitter. In this station, the power is transformed to 10 kV, and is fed by underground cable to the transmitter.

Two Kinds of Electric Wave

The transmitter consists of two units of 1000 kW power each; they operate together. One transmitter unit operates at audio frequency; the other, at radio frequency. The latter generates that electric carrier wave of 530 kilohertz frequency which represents the wavelength of the Kossuth transmitter, and it also amplifies same. The audio frequency unit receives the program-carrying waves from the studio in Budapest. (The power of these waves is a fraction of one watt.) The audio frequency unit amplifies this wave also, mixes the two waves, so as to "include" the sound wave with the carrier wave. In the mixing process, the sound waves change —— modulate — the amplitude of the carrier wave. For this reason, transmitters of this design are called amplitude-modulated transmitters (all medium-wave transmitters operate in this manner).

For reasons of dependability, the waves carrying the program are received through two paths. One is an underground cable with amplifiers at regular intervals to make up the energy losses. There is also another channel, consisting of a chain of parabolic antennas on towers in intervals. They transmit the television programs and the UHF programs also. Through this channel,

the program reaches Solt over a microwave chain. In Solt, the signal is reconverted into audio frequency signals. The dual transmission assures that the program can be broadcast dependably even if one channel malfunctions and has to be repaired.

In principle, the transmitter does not differ from earlier transmitters; however, every development has been incorporated in its design and manufacture. The terminal amplifier tubes of the two units (the radio frequency and audio frequency units) are electron tubes, 70 cm tall and 20 cm in diameter. These huge tubes — as well as the overall system — produce large amounts of heat, which has to be dissipated partly by air cooling and partly by water cooling. The anodes of the tubes are immersed in water which evaporates, thereby dissipating the heat.

Protection of the Environment

Much attention has been given to the protection of health and the environment during the designing stage. Science is faced still with many problems in this area. The high-frequency field emitted by the transmitter and the antenna tower is harmful to health to someone continuously exposed to it. But the opinions differ about the field strength which is actually hazardous. According to some experts, 1000 volt/meters (the way of expressing the magnitude of field strength) is harmful; others think that one-fifth of this is already harmful. In Solt, the hazard limit was established at the level of 10 (the Soviet standard), and measures were instituted to keep within this limit.

Protection of people is evaluated on the basis of two considerations. One involves the workers at the station, the other involves those residing near the station or approach the station "without having any business there." Insofar as the workers at the station are concerned, the building is equipped with a so-called shield. The shielding prevents those working at the facility to be exposed continuously to the high-frequency field. Spaces where people operate the station have cubicles for the staff where protection is provided.

Insofar as the residents of the area are concerned, the farms located within a radius of 1.75 kilometers from the antenna have been displaced. Those displaced were provided with substitute residences. The transmitter facility is fenced in; no unauthorized individuals can enter the dangerous high-frequency field. In any event, one would have to dwell for a long time there before sustaining harm.

But the high-frequency field harms not only living organisms; it also interferes with operations such as electric transmission lines, communications, and other facilities. Thus, all high-voltage lines were removed in a two-kilometer radius around the antenna, and any communications lines were placed underground over a radius of five kilometers.

Once the trial runs of the large transmitter in Solt are completed and the facility will take over the broadcasting of the program of the Kossuth station, 80 percent of the area of the country (as compared to 50 percent presently) will have good reception. This means that the 26 dB surplus will be available over this area, so that excellent reception will be available even in the event if another transmitter were to broadcast at the wavelength of Kossuth radio. In addition, the quality of the reception will be better than before over much of the area.

2542
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HUNGARY PRODUCES SOVIET STIMULANT

Budapest MAGYAR NEMZET in Hungarian 27 Jan 77 p 3

[Summary] A Soviet preparation, "Sydnocarb," is to be produced by the Kobanya Pharmaceutical Factory and marketed in Hungary as well as in other countries. Dr Edit Varga, director of the Kobanya Factory, said this is the first instance of the kind of scientific cooperation as the result of which an original drug developed in the Soviet Union will be manufactured and sold by a Hungarian factory.

Sydnocarb is a preparation which acts on the central nervous system and stimulates brain activity and alertness. It has been used successfully on mentally retarded children and for various psychic diseases. Sydnocarb has been on the market in the Soviet Union since 1970. Hungarian clinical testing has confirmed its effectiveness and pharmaceutical value.

Present at the press briefing held on the occasion of the preparation's being put on the market in Hungary were Professor K. J. Novitski, director of the All-Union Pharmaceutical Chemistry Scientific Research Institute which prepares the active ingredient of the medication, and Professor M. D. Maskovski, corresponding member of the Soviet Academy of Medical Sciences, who directed pharmacological investigation of the preparation.

CSO: 2502

BRIEFS

HUNGARIAN-GDR COMPUTER COLLABORATION--Yet another experimental tele-data processing system is being tested at the Computer Technology and Automation Research Institute in Hungary through linkage of the Hungarian R-10 and GDR-produced R-40 computers. The first such connected system was set up last year at the Electric Power Industry Research Institute, and according to plans, this will later be the information system of the Ministry of Heavy Industry. The connection of the computers was worked out at the development institute of Videoton in collaboration with the two institutes. Because of its high capacity, it does not pay to have the R-40 operating by itself in the field of tele-data processing. Therefore, on the basis of cooperation between the two countries in the field of computer technology, the R-10 was designed in such a way that it would be compatible with the R-40. When it is installed beside the latter, it will take over control of it. When set up in distant and widely separated cities, it can maintain connection with the computer center. This year Videoton will ship seven R-10 computers to the GDR from which Hungary will buy three high-capacity R-40 computers. At present 23 systems made up of Hungarian computers are operating in the GDR; Hungary operates four R-40 computers at present. [Budapest ESTI HIRLAP in Hungarian 24 Jan 77 p 1]

R-10 COMPUTER FOR HOSPITAL--A Hungarian-made R-10 has been installed at the county hospital of Szekszard. This first instance of a computer at the service of a hospital is experimental. Initially the computer will maintain direct connection with 16 beds in the hospital's division of internal medicine. In addition, it will manage the supply and distribution of drugs, be used for bookeeping and payroll work and will monitor the management of hospital equipment and supplies. In the future, the computer is to process the work of the central laboratory and the X-ray department. [Budapest HETFOI HIREK in Hungarian 24 Jan 77 p 3]

SOFTWARE DEMONSTRATION CENTER--By the end of the year the National Software Archives and Tracking Service will put into operation all the programs it has in circulation. They will be run on the Ryad-1030 computer installed in the Telephone Factory by NOTO-OSZV [National Organization for Technical Servicing, National Computer Technology Enterprise]. By early next year customers will have the opportunity of testing the programs they are interested in buying before actually making a purchase. [Budapest SZAMITASTECHNIKA in Hungarian Dec 76 p 7]

R-10 COMPUTER FOR MEDICAL UNIVERSITY--The new R-10 computer of Szeged Medical University was officially put into operation on the first of December by the university rector. Present at the ceremonies were representatives of the National Technical Development Committee, the Ministry of Health and the VIDEOTON Factory. The University is in an exceptionally favorable position insofar as use of computers for medical purposes is concerned. For a decade its central laboratory has maintained good professional relations with the Cybernetics Laboratory of the Attila Jozsef University. Even on an international level it does important work in research and development; it has achieved good results in working out processes for form recognition and picture evaluation by computer. The computer will be used to establish a patient data bank. The machine will also be used to analyze the bioelectric signals of patients: brain function, respiration, cardiac examination analysis. In addition to the foregoing, the computer center will assist research work in the mathematical-statistical evaluation of experiments conducted at the university. [Budapest SZAMITASTECHNIKA in Hungarian Dec 76 p 11]

CSO: 2502

COMPUTERIZATION OF FOREIGN TRADE, MERCHANT FLEET OUTLINED

Warsaw INFORMATYKA in Polish No 11, 1976 pp 32-36

[Article by Krystyn Bernatowicz: "Computerization Results in Foreign Trade and the Merchant Fleet"]

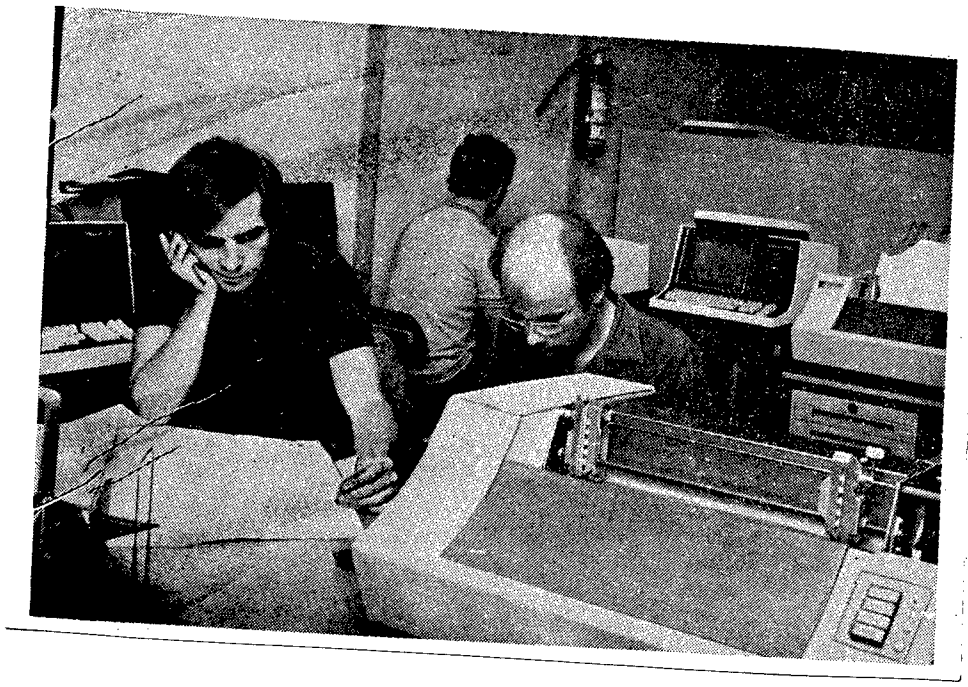
[Text] For a long time now, and especially lately, we have grown accustomed to perceiving the prosperity of the national economy in terms of foreign trade expansion. To be sure, a basic requirement for such expansion is the quality and quantity of production as well as expansion of transport potential. Because we are again a maritime nation, we export as well as import many goods via the sea. It is for this reason that of all the possible means of transport only the merchant shipping industry was organically linked with the Ministry of Foreign Trade. Long before these two activities were merged, the possibility of improving their operations was sought in the use of computers. In 1966 foreign trade turnovers amounted to 19,064 million foreign exchange zlotys, and our merchant fleet accounted for 33.8 percent of all goods transported.[1] Thus 12,669,000 tons of goods were transported via ships. But Polish ports handled 26,922,000 tons of goods, and the Polish merchant fleet consisted of 211 ships. Also in 1966, 11,210 ships, flying various flags, were dispatched to the three ports (Gdansk, Gdynia and Szczecin). In light of this data, it is obvious that during this time the primary and largest customers of the ZETO [Electronic Computer Technology Enterprises] in Gdynia and somewhat later in Szczecin were the ports and the merchant fleet; foreign trade enterprises obtained this type of service elsewhere. However, even then it was obvious that in light of planned future tasks that type of setup was merely a palliative.

The dynamic expansion and acceleration of the economy that occurred after December made computerization, which one day would be capable of stimulating this acceleration, an absolute necessity. In a short time, however, it became evident that it is impossible to efficiently expedite via traditional equipment and ways all the information required by foreign trade and the

1. All statistical data obtained from the GUS ROCZNIK STATYSTYCZNY, 1976.

merchant fleet. Since, come what may, foreign trade as well as the maritime economy can be successful only if fast, accurate information--on which fast, optimum decisions can be based--is available. An exceedingly sensitive barometer of business and demand should be under very precise control.

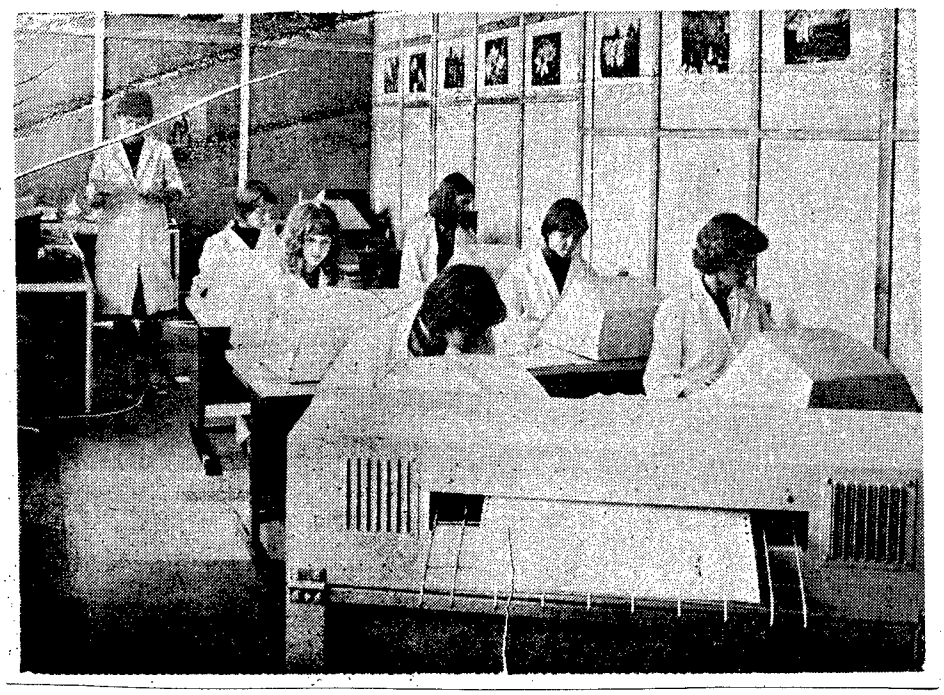
In 1971 foreign trade turnovers quadrupled. There were 278 ships flying the Polish flag. The ports were bursting at the seams; during the year, 12,205 ships docked from which 37.3 million tons of freight were unloaded. The Polish fleet transported 18,000 tons of goods. Freight in containers began somewhat earlier (in 1970, 4,000 tons were transported).



Photograph 1. The operational DATA POINT 2200 ASERK system was programmed for transoceanic transmission tasks by Magister Engineer Piotr Kowalewski (left) and Magister Engineer Andrzej Zochowski. At one time, Piotr Kowalewski was one of the mainstays of the Gdansk ZETO.

The multifunctional and easily accessible ZETO was already unable to keep pace with demand and handle the entire range of requirements of the Ministry of Shipping.

On 1 July 1972 the Ministry of Shipping Computer Center was created. The foundation for the new center in Gdynia was the local ZETO. Based on an agreement between the Ministry of Shipping and the Ministry of Higher Education, Science and Technology, the Center obtained operational systems for the needs of the merchant fleet (developed by ZETO) and a cadre of 13 people. Dr Jan Z. Zydowo, former director of the Gdynia ZETO became chief of the Center.



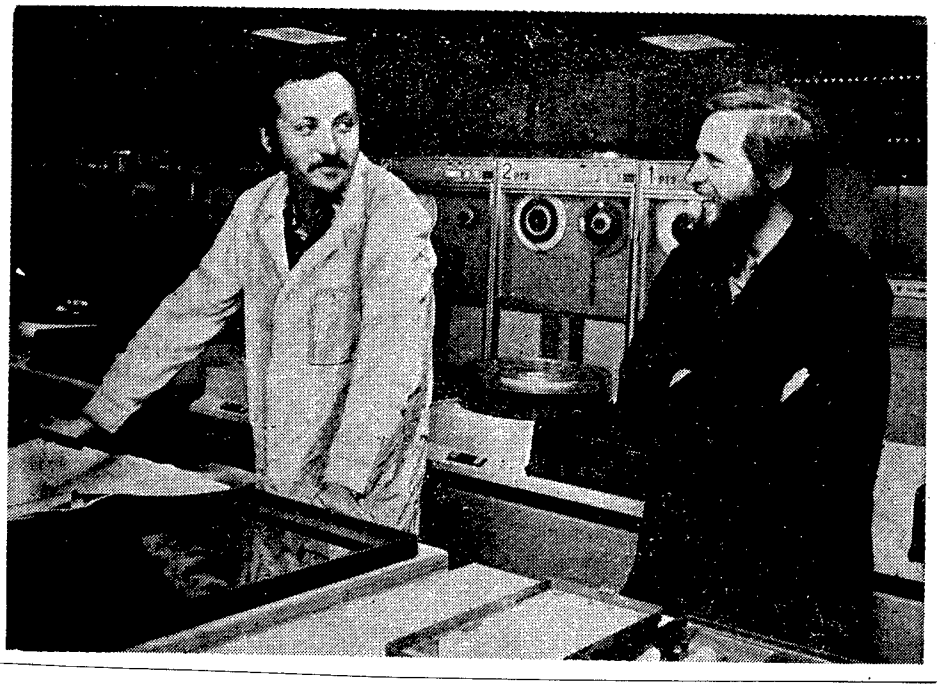
Photograph 2. The irksome problem faced by many computer center managers--the large turnover in keypunch operators--can be overcome (but not easily) by installing magnetic tape recording equipment. A six-position STEECHECK, which will shortly be replaced by an RC system, is presently in operation in Gdynia. At the keyboards (starting from the left row) are: Danuta Smigielska, Jadwiga Talaska, Barbara Misiaszek, Wieslawa Drozdowska, Jolanta Murzynowka and Maria Ornas. On the left is Maria Skolczek, director of the data preparation department.

There were shortages of practically everything. The building they obtained was meant to be a grocery store. Rooms in which to install equipment, which is most essential to information science, namely the computer, were lacking. However, since there was no computer they would have been superfluous. As luck would have it, the ZETO turned out to be a real ally and did not mind sharing its ICL computer in accordance with the mentioned agreement between the ministries.

It was not until 1975 that the Center received its own computer. Two months later, the double doors of a new building located at the entrance of Port Gdynia and containing an ODRA 1305 computer (basic model with a 64k-word memory) were opened to the staff (now Numbering 270).

After that came the high times. In 1974 foreign trade turnovers amounted to 62,447 million foreign exchange zlotys. The number of ships in the Polish fleet increased to 307 (including two ships in excess of 50,000 tons each); these ships hauled 25,982,000 tons of freight. The ports registered

12,205 incoming ships, which handled 52,535,000 tons of goods. The transport and conveyance of containerized cargo increased dramatically (to 146,000 tons), and the percentage of cargo transported by ship increased to 39.7 percent. One out of every 65 people working in the socialized economy was employed in the maritime economy.



Photograph 3. The ICL 1904E computer, purchased second-hand via an advertisement, originally consisted only of a central processing unit having 96k words of internal storage. To make it operational, it was necessary to equip it with peripheral equipment. Only domestic equipment was available. Adapting the peripheral equipment to the ICL central processor unit was accomplished via the efforts of Magister Engineer Andrzej Radziszowski (left) and Magister Wojciech Zydowo.

Such a rapid growth in the indices was caused by the rapid growth of the national economy and, in association with this, the increase in outlays for the Ministry of Foreign Trade and Maritime Economy whose computer center provided many benefits (after the merger of the Ministry of Foreign Trade and the Ministry of Shipping the name of the computer center was changed to the Foreign Trade and Maritime Economy Computer Center). The Center obtained another computer, a used ICL 1904E, via an advertisement, which was cheap and quite large (internal storage 96k words). The ODRA's storage capacity was increased to 128k words, which was necessary because of the addition of a data transmission network and operation in the on-line mode. Next, an ICL 7903 communications processor was purchased, and the number of peripheral equipments was increased to include: three line printers, two card readers and two paper tape reader-punchers. Both computers, including their

peripheral equipment, operate with a total of 14 tape memories, and the ODRA has 18 disk memories (7.5 Mbits each) while the ICL has 6. The equipment is complemented by DATA POINT 2200 and 5500 minicomputers and a five-position SEECHECK magnetic tape data recorder (before long the recorder will be transferred to Szczecin and replaced with similar equipment from RC).

This equipment, logically accumulated and suited to the integrated program of application goals, has been quickly put to use by the Center. Moreover, the Center was able to achieve very impressive results with it in a very short time. Six months after its establishment, the ministry already was able to discontinue subsidizing the Center.

A few words about the organization of the Center's operations. From the start, the goal (consequently realized) was to form a multiaccessible system based on data transmission and on-line operation.

To continue, a word about off-line processing on the ICL 1904E computer (being set up as a backup in case the ODRA 1305 fails and also set up for batch operations).

Batch operations consist of systems that operate cyclicly and thus involve: several dozen file data and port transhipment clearing systems, supply systems and wage systems. Moreover, the computer is made available during idle times for the use of institutions outside the ministry (for example, the Polish Academy of Sciences Institute for Hydraulic Construction, and the Regional Center for Information Science).

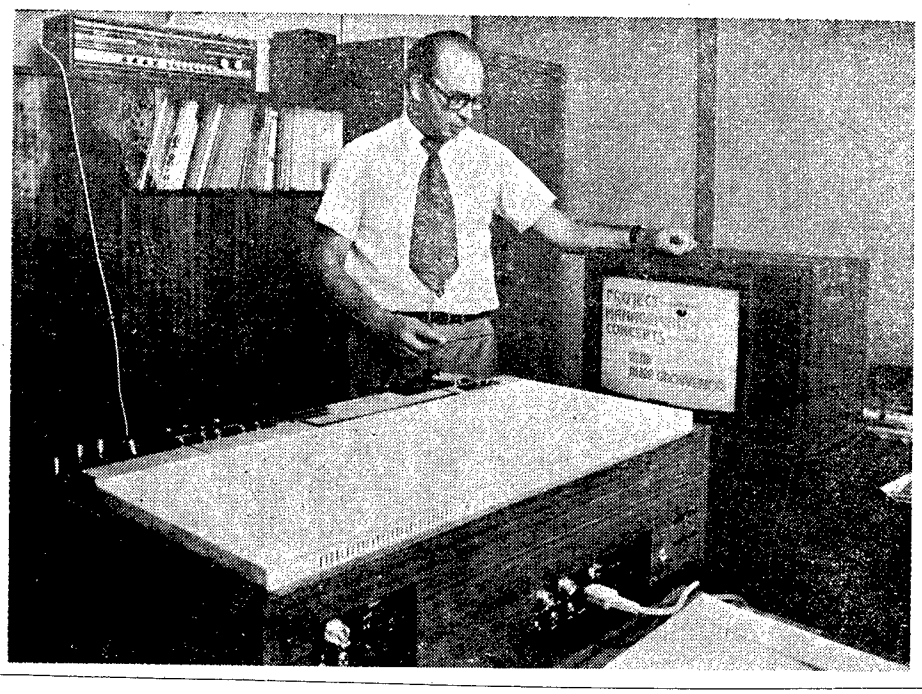
The structure and size of the ministry determined the Center's work organization. The Center operates for the benefit of over 200 enterprises. The Center coordinates the work of centers in Gdynia, Szczecin, Warsaw and Katowice. Because the Katowice center is just becoming operational and the centers in Warsaw (foreign trade enterprises) and Szczecin (maritime economy enterprises) are on their way to success (the Warsaw center has the DATA POINT 2200 and 5500 minicomputers), the most important role, naturally, falls on the Gdynia center. Above all, this center developed conversational systems based on the ODRA 1305. The first one, called DYSPORT, is an information system for the berthing master of the Association of Ports; it also serves as an information system for the ministry and the association directorate in Gdansk, Gdynia, Szczecin, Swinoujscie and Kolobrzeg to aid in the management of the mentioned ports and to transmit on demand via CRT monitors the following summaries:

Monthly Transhipment Plan;
Quarterly Transhipment Plan;
Implementation of Monthly Plans;
Implementation of the Quarterly and National Economic Plans;
List of Summaries in the System;

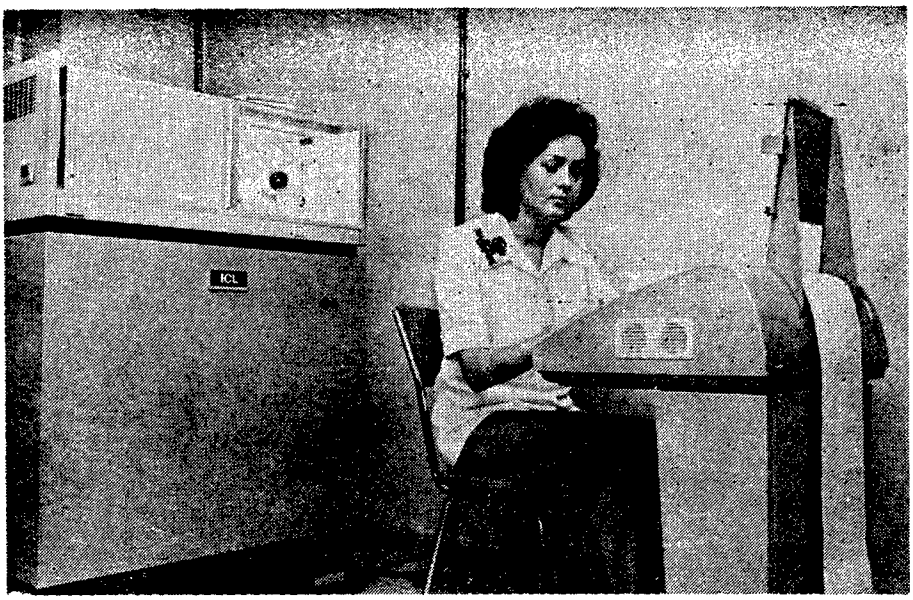
Employment of Workers Handling the Transhipments;
Ships: Coal and Ore,
Bulk Carriers and Fuel Carriers;
Grain Carriers and Timber Carriers;
Aggregate;
Total Turnover of Railroad Cars;
Turnover of Coal Cars;
Coal Traffic and Ore Status;
Status of Goods in Warehouses;
Status of Goods on the Wharfs;
Word Commentaries;
Average Transhipments;
Transhipments in One Port;
Information Concerning Peak Transhipments.

The status report lists the volume of transhipments (according to type: coal, ore, grain and so forth) handled during a 24-hour period and from the start of the month as well as the largest transhipment to occur on a daily basis in the current month. In addition to the berthing master, the ministry and Directorate of the Association of Ports also receive the information. The DYSPORT data bank is brought up to date daily; data are transmitted from the ports via teletype. Addressees of information processed by DYSPORT--the berthing master and the ministry--receive it via ICL CRT terminals in a conversational mode.

The ASERK [Automatic System for Recording the Movement of Containerized Traffic] system is very effective and useful. The transport of containerized freight, justifiably reputed to be the most modern in the world, is very profitable providing the containers are in constant use and do not get lost. Containers are very expensive. The construction of a container base in Gdynia (capable of handling 2,000 containers of over 40 tons each) has begun. ASERK will improve container operations and traffic. The loading and unloading of containers must be documented. Until now, a port manager could not make early preparations for unloading a container ship before its arrival in port because the documentation was on the ship itself. But now, thanks to ASERK, the port of destination receives complete documentation via teletransmission after the ship is loaded at its home port. Presently, Gdynia and New York are linked via undersea telephone cable having a capacity of 50 Bauds. Intercommunications are conducted via a DATA POINT computer in New York and an ODRA 1305 computer in Gdynia. The organizational structure of the system is depicted in figure 1.



Photograph 4. Before Dr Engineer Jan Z. Zydowo established the Ministry of Shipping Computer Center, he organized two other centers. Under pioneering conditions, he organized the Electronic Computer Equipment [ETO] center in Gdansk at the Central Ship Designing Office [CBKO] (using the Elliot 803 computer), and at the ZETO in Gdynia. Training for the staff is of particular concern to the Center's director. One of the most interesting methods is to use the training process purchased in the United States, serialized courses on ADP system design and courses on computer center management recorded on color video tape. The easily accessible, attractive and well prepared lectures are attended by various partisans in the Center.



Photograph 5. Because it is located in different parts of the Tricity area, the program design group is equipped with CRT or teletype terminals that enable remote access program verification.

Independent of its usefulness to the originating ministry, this system was purchased by an American firm.

The utilization and movement of Polish containers on the North American continent are controlled with the aid of this system. In addition to communications with New York, very shortly a link will be established with Great Britain and other West European nations. The system's constant operation since August has shown it to be highly reliable. Other systems working on-line are: SAFIKS, a system designed for the Polish Ocean Lines [PLO] that settles ocean freight accounts; and TOPAZ, a system designed for the Maritime Supply Center, a center that organizes supplies for the fishing fleet, frequently deep sea ships, as well as supplies for individual fishing ships and the PLO. This system allows us to completely eliminate supply tickets and bookkeeping. To operate TOPAZ, 17 CRT terminals equipped with printers were installed. The next task for the programmers and designers group is to design a system to protect and reconstruct data banks and to reproduce them in case of any kind of computer failure.

Teletransmission, of which much has been said, is used internally by the Center. Because of the Center's dispersed operations, (buildings at 3 Maja, Gdynia, and in Oliwa and Gdansk) ICL CRT terminals have been installed at these locations, which eliminates the necessity of arduous trips to the

computer building. It is one of the most important benefits, but not the only one, resulting from the use of teletransmission. Another bene fit, saving thousands of cards, is the transmission of data from the port of Gdansk where an 8-position RC equipment stand to record data on magnetic tape is located and where it is transmitted to the computer in Gdynia; return calculations are retransmitted. The systematic limitation of batch operations and the expansion of the teletransmission network will almost completely eliminate the use of cards. With this in mind, it is expected that the SEECHECK system will be transferred to the center in Szczecin, and in the future transmission lines will be set up.

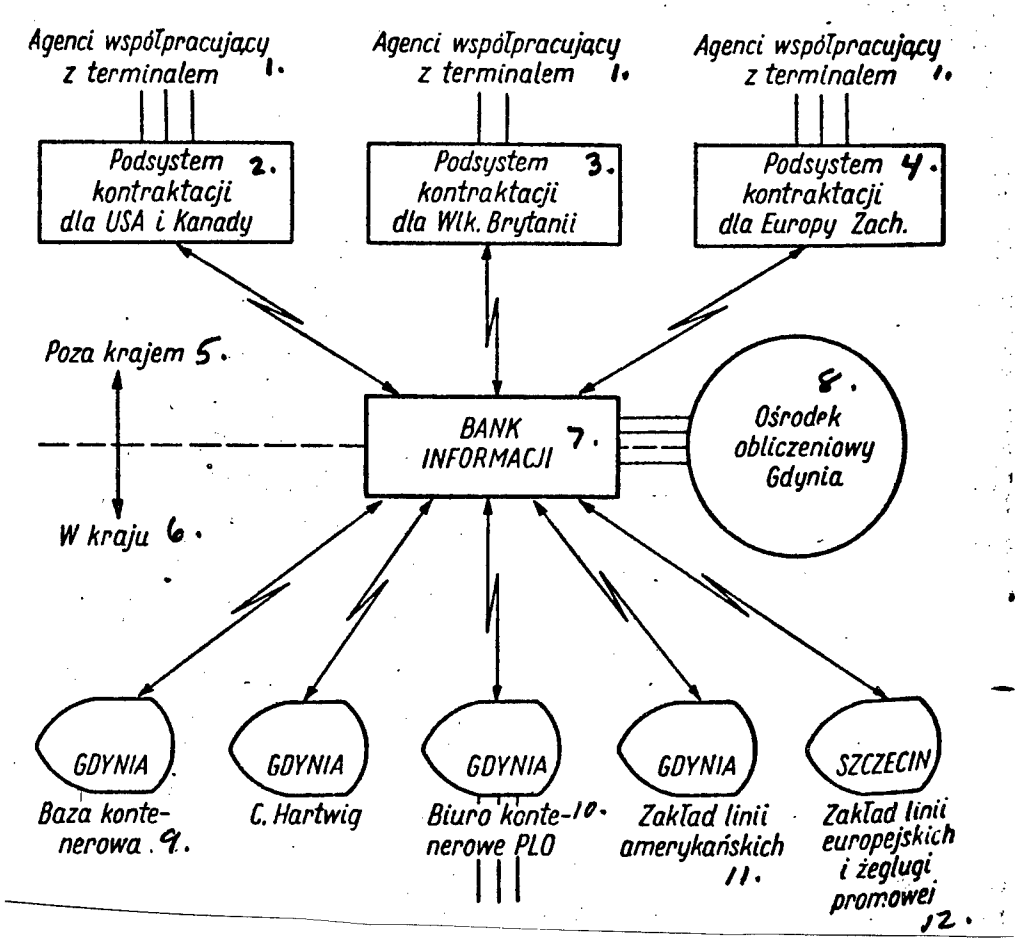
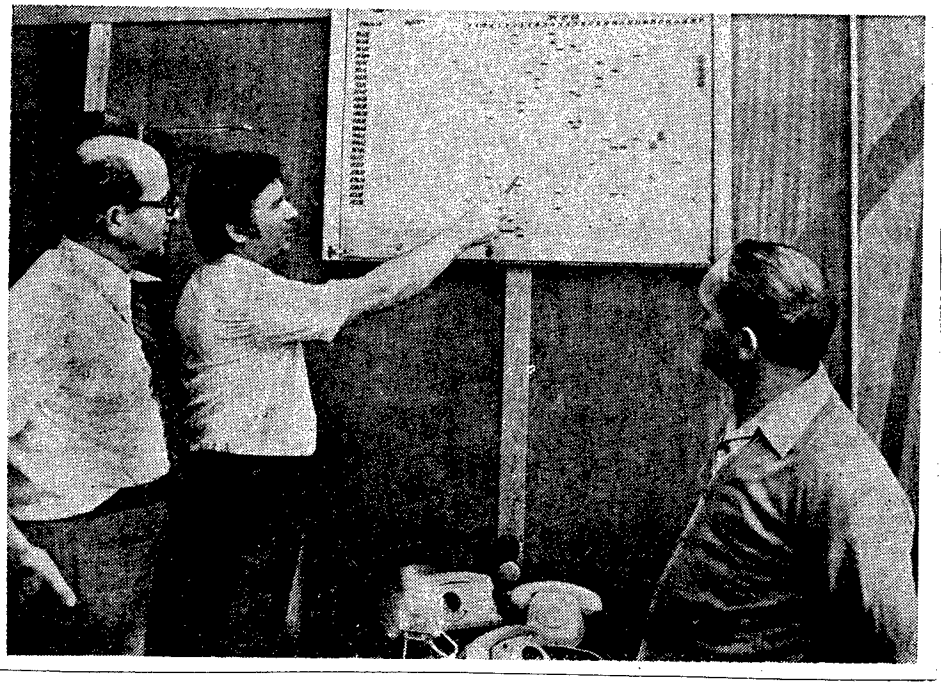


Figure 1. External structure of the container system.

[Key on following page]

Key:

1. Agencies with terminals
2. Subsystem of supply contracts for the United States and Canada
3. Subsystem of supply contracts for Great Britain
4. Subsystem of supply contracts for Western Europe
5. Outside Poland
6. Inside Poland
7. Data bank
8. Gdynia Computer Center
9. Container base
10. PLO container office
11. American Lines enterprise
12. European lines and ferry lines enterprise



Photograph 6. The Ministry of Foreign Trade and Maritime Economy Computer Center is composed of the Development Center (responsible for matters concerning hardware), the Computation Centers (operation of systems), and the Design and Programming Center (system design and software). In the photo from the left are: Magister Roman Stygar, director of the Development Center; Engineer Zbigniew Czyrek, director of the Gdynia Computer Center; and Magister Stefan Rakowski, director of the Design and Programming Center.

The installation of additional minicomputers by the enterprises (for example, the PLO has currently four DATA POINT 2200 units) will permit the implementation of distributed processing, initiated by the DIEBOLD program. Of course, additional development work on a multiaccessible system is conditioned on the availability of additional large-capacity disk memories--up to 60 Mbits--, and also perfecting the operating systems--something already within the Center's capabilities. To date, operations are limited to the GEORGE-2 system which operates jointly with the communication minicomputer (ICL system) as well as the Center's own OLS-DRIVER.

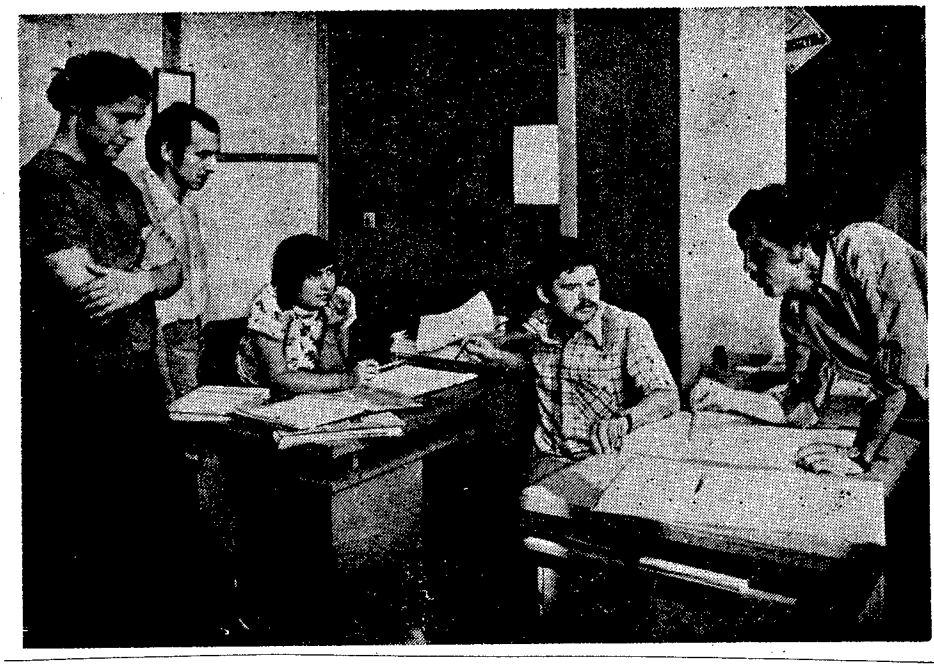
Photograph 7. In the rhythm of daily work, discussing their work with one another, are (from the left): Magister Teodora Kasprzyk, deputy director of the Foreign Trade Office; Magister Edmund Cieslewicz, director of the Shipping Office; Magister S. Rakowski, chief analyst of the Center; and Magister Jerzy Grus, director of the Fishing Industry Office.

Not only were the above tasks executed in a very short time, but even more surprising they were executed by a young staff with little experience. Employment growth (1972--13 people, 1973--103 people, 1974--195 people, 1975--274 people, and currently--339 people), dictated by the rapid increase in tasks, was so fast that with the universal shortage of computer personnel it was very difficult to obtain people with extensive experience, especially since the Gdansk region contains quite a number of computer centers. Thus, it was necessary to rely on young people, especially graduates of the higher schools in the Tricity area.

Photograph 9. As in many computer center buildings in Poland, the computer room is one of the most elegant. While it is attractive, it is also noisy. This noise, however, is evidence that the Center contains a great deal of hardware.

In the presentation thus far of the Center's accomplishments, the point emphasized in the report's title was described only implicitly. Let us, therefore, refer to the data. For example, it has been calculated that the monthly operation of the ASERK system brought about $50,000 in savings, achieved by better management of containers. With the use of the TOPAZ system, many repetitious accounting and supply tasks have been eliminated. In addition, millions of cards are saved with the use of data transmission and magnetic data carriers. The value of the work (according to sale prices) for 1975 (the computers worked 2.5 shifts) amounted to 26,910,000 zlotys.

This does not mean in the least bit that the Center intends to rest on its laurels. Presently, the most urgent task is to rapidly expand the foreign trade centers in Warsaw and Katowice. Their task will be to serve numerous foreign trade centrals, an important task in view of the growing role of foreign trade. It is expected that the Katowice center will be completed before 1980. On the other hand, it is absolutely urgent to begin the expansion and building of a new center in Warsaw. On a relative basis, the Szczecin center, which will be lodged in the new ZETO building, is in the best situation.



Photograph 8. Operating systems on-line requires special care to protect data files, especially when processing. In the absence of such protection, hardware failure can cause irreparable losses. Thus a great deal of responsibility rests on the shoulders of the young group responsible for system protection and the ministry's on-line systems. In the photo from the left are: Magister Engineer Jerzy Kierkowski, Magister Engineer Pawel Pietrzak, Magister Ewa Kruk, Magister Engineer Tadeusz Drozd, and Magister Wojciech Koziol (director of the group).

In mid-1976, of the Center's 339 workers, 242 had higher education (including 84 in engineering, 97 in economics) and over 30 individuals received additional pay for knowledge of foreign languages. This staff, which deserves a lot of recognition, is very stable. To be sure, it is not because of their pay. In the Center, once again the opinion was confirmed that the staff's flexibility efficiently counteracts job standards placed before it. The allocation of difficult and interesting tasks, however, must be accompanied by aid in their realization, and thus systematic improvement via training and experience (foreign included).

Another matter, which does not mean it is not urgent, is the building of a transmission network between the mentioned cities.

In view of the Center's accomplishments to date, we have faith that future goals will be realized. In the meantime, the Center is preparing to move to the new building in Gdansk. A center to serve Gdynia's foreign trade and maritime economy enterprises will remain in Gdynia.

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